Perceptual-skill training for decision making in beach-volleyball defence: Scrutinising the colour-cue method

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The colour-cueing method was introduced to enhance decision-making skills in video-based training programs. However, the method's functionality is under debate (Abernethy et al., 2012; Klostermann et al., 2015, 2017). Thus, the present series of studies investigated whether earlier null findings resulted from non-matching gaze-path protocols (Exp. 1) and response modes (Exp. 2) over the intervention phase. Positive training effects were particularly expected for congruent training-testing conditions.

Novices were trained with expert gaze paths by implementing coloured patches in beach-volleyball-training videos. In Exp. 1, participants (N = 14 in each of the three groups) learned with gaze paths that highlighted experts' gaze behaviour recorded either under verbal-response or action-response conditions or without gaze paths. In Exp. 2, in addition to gaze-path vs. no-gaze-path learning, participants (N = 13 in each of the four groups) were trained either under verbal- or action-response conditions. Decision-making performance was tested in pre-, post- and retention tests with verbal (put down in writing) and action (recorded by a VICON-motion-capture system, 200 Hz) responses. Gaze behaviour was recorded with an integrated mobile eye-tracking system (EyeSeeCam, 220 Hz). As dependent variables, response accuracy and deviation of participants' gaze to the verbal- and action-gaze paths were calculated and analysed with mixed-factorial ANOVAs and planned contrasts.

In both experiments, gaze deviation showed significant main effects for response mode (all ps < .01, all η_p^2 < .28) with participants' gaze being closer to the gaze path of the matching test condition irrespective of time of test and intervention type (all ps > .09, all η_p^2 < .06). Furthermore, participants improved response accuracy over time in the verbal response mode in both experiments (all ps < .01, η_p^2 > .25), in Exp. 2 in the action response mode only (p < .01, η_p^2 = .20), irrespective of intervention type (all ps > .77, all η_p^2 < .03).

The results elucidate that, even under perfectly matched intervention and test conditions, previously reported positive effects of colour cueing cannot be replicated. Thus, to summarize the current state of research more rigorously, additionally, a meta-analysis on the effects of the colour-cueing method was conducted. In sum, similar effect sizes and largely overlapping confidence intervals were found when contrasting the colour-cue and the control groups. Consequently, displaying experts' gaze behaviour with coloured patches in video-based training programs does *not* seem to yield any benefit in the acquisition of decision-making skills.

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